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## TITLE OF INVENTION

WATER DISPERSIBLE GRANULE CONTAINING PARAQUAT DICHLORIDE AND ITS  
APPLICANT(S) FOR DO/EO/US PREPARING METHOD

CHUNG, Bong Jin; Kim, Seung Ho; CHUNG, Kwang Jin; AN, Byoung Woo; et al.

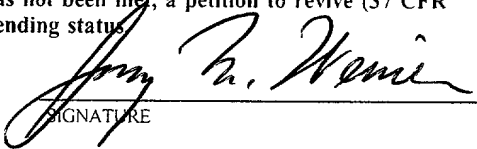
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☐ is attached hereto (required only if not communicated by the International Bureau).
  - b. ☒ has been communicated by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
  - a. ☒ is attached hereto.
  - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. ☐ are attached hereto (required only if not communicated by the International Bureau)
  - b. ☐ have been communicated by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

## Items 11 to 20 below concern document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A FIRST preliminary amendment.
14. ☐ A SECOND or SUBSEQUENT preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4)
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information: *Power of Attorney;*

PTO-2038

U.S. APPLICATION NO. (if known) <b>12/088942</b> INTERNATIONAL APPLICATION NO. <b>PCT/KR00/01051</b>		ATTORNEY'S DOCKET NUMBER <b>PAS205PCTUS</b>																										
21. <input checked="" type="checkbox"/> The following fees are submitted: <b>BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):</b> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO. .... <b>\$1040.00</b> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... <b>\$890.00</b> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... <b>\$740.00</b> International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... <b>\$710.00</b> International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) ..... <b>\$100.00</b> <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>		<b>CALCULATIONS PTO USE ONLY</b>																										
Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).		<b>\$ 1040.</b>																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">CLAIMS</th> <th style="width: 20%;">NUMBER FILED</th> <th style="width: 20%;">NUMBER EXTRA</th> <th style="width: 20%;">RATE</th> <th style="width: 20%;">\$</th> </tr> </thead> <tbody> <tr> <td>Total claims</td> <td>5 - 20 =</td> <td>0</td> <td>x \$18.00</td> <td>\$ 0</td> </tr> <tr> <td>Independent claims</td> <td>2 - 3 =</td> <td>0</td> <td>x \$84.00</td> <td>\$ 0</td> </tr> <tr> <td colspan="4">MULTIPLE DEPENDENT CLAIM(S) (if applicable) 0</td> <td>+ \$280.00</td> </tr> <tr> <td colspan="4"><b>TOTAL OF ABOVE CALCULATIONS =</b></td> <td><b>\$ 1040.</b></td> </tr> </tbody> </table>		CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	\$	Total claims	5 - 20 =	0	x \$18.00	\$ 0	Independent claims	2 - 3 =	0	x \$84.00	\$ 0	MULTIPLE DEPENDENT CLAIM(S) (if applicable) 0				+ \$280.00	<b>TOTAL OF ABOVE CALCULATIONS =</b>				<b>\$ 1040.</b>	<b>\$ 0.</b>	
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<b>WEINER &amp; BURT, P.C.</b> <b>635 N. US-23</b> <b>P.O. BOX 186</b> <b>HARRISVILLE, MI 48740</b>		 SIGNATURE <b>Irving M. Weiner</b> NAME <b>22168</b> REGISTRATION NUMBER																										

**WATER DISPERSIBLE GRANULE CONTAINING  
PARAQUAT DICHLORIDE AND ITS PREPARING METHOD**

**Technical Field**

5       The present invention relates to a water dispersible granule containing Paraquat Dichloride (hereunder referred to as "Paraquat") and its preparing method. Paraquat, an active component of a nonselective herbicide, is generally known not to show herbicidal activity since it is strongly adsorbed to minerals in the soil. More particularly, the invention relates to a water dispersible granule containing Paraquat and its preparing  
10   method that comprises mixing and kneading 5-50wt% of Paraquat, 5-30wt% of a surfactant, 1-20wt% of a breakage promoter, and the remainder being an extender, forming granules out of the kneaded mixture using a granulator, and drying the granules.

15 **Background Art**

Soluble concentrate of 24.5%-Paraquat, currently sold in the market may cause skin damage and may be absorbed through the skin when it comes in contact with the skin. The soluble concentrate sprayed may be inhaled through the respiratory organ to cause poisoning. Further, it can be fatal to ingest it by accident or on purpose unless first  
20   aid is taken within 4 hours after ingestion.

When an anionic surfactant is added to increase the adhesion between leaf and Paraquat, there may be a problem of cohesion or precipitation between the Paraquat and the anionic surfactant. There was an attempt to solve this problem using an aliphatic or aromatic chelating compound (US Patent 5,668,086). However, it could not solve the  
25   forementioned safety problem.

To solve the safety problem, there was an attempt to prepare the Paraquat composition having a formulation type other than the soluble concentrate type. However, the attempt was limited because Paraquat is known to be adsorbed tightly to minerals, especially to the ones used as extenders, such as clay, bentonite, talc, pyrophyllite and montmorillonite, and consequently show no herbicidal activity.

As another attempt, a method of preparing a water-soluble granule by mixing powdery amitrole with liquid Paraquat was reported (US Patent 5,635,445). However, the water-soluble granule provides a weaker effect than the soluble concentrate, and the cost is increased because it is prepared with two components.

Further, there was an attempt to prepare the paraquat composition as a wettable powder, which has problems of inhalation poisoning of the scattered powder and cost increase related to the purification of Paraquat.

Accordingly, it is required to prepare a formulation type which solves the aforementioned problems and has superior herbicidal effect, safety and low cost.

### **Disclosure of Invention**

An object of the present invention is to provide water dispersible granule and its preparing method which comprises mixing and kneading Paraquat, a surfactant, a breakage promoter, and an extender; forming granules out of the kneaded mixture; and drying the granules. In this case, Paraquat is, an active component of a nonselective herbicide, is known not to show herbicidal activity due to its strong adsorption to minerals in the soil, particularly to the ones used as extenders, such as clay, bentonite, talc, pyrophyllite and montmorillonite. Further, the water dispersible granule shows a superior herbicidal effect on weeds on ridgeway or non-farm land, compared with the soluble concentrate or the wettable powder of Paraquat.

Another object of the present invention is to provide a safe agrochemical composition which reduces poisoning caused by contact or ingestion and prevents the danger of intake by accident or on purpose, by mixing Paraquat (active component of the agrochemical), a surfactant, a breakage promoter, and an extender, and forming granules out of the mixture.

To achieve the object of the invention, the water-dispersible granule containing paraquat according to the present invention comprises 5-50wt% of Paraquat, 5-30wt% of a surfactant, 1-20wt% of a breakage promoter, and the remainder being an extender, wherein said water dispersible granule is prepared by mixing the above components, kneading the mixture together with a small amount of water, forming granules out of the kneaded mixture using a granulator or the like, and drying the granules.

Paraquat, an agrochemical active component, is a superior herbicidal active compound, which shows fast effect and removes various weeds.

As the surfactant, an anionic a surfactant and/or a nonionic surfactant can be used.

As the a breakage promoter, at least one selected from the group consisting of sodium sulfate ( $\text{Na}_2\text{SO}_4$ ), sodium nitrate ( $\text{NaNO}_3$ ), potassium chloride (KCl), ammonium sulfate ( $(\text{NH}_4)_2\text{SO}_4$ ), urea, polyvinyl pyrrolidone, and the like can be used.

As the extender, at least one selected from the group consisting of diollite, kaolin, clay, white carbon, water-soluble starch, calcium carbonate, bentonite, pyrophyllite, talc, and the like can be used.

A preparing method of water dispersible granule containing paraquat according to the present invention comprises: a) mixing paraquat dichloride, a surfactant, a breakage promoter, and an extender, and kneading the mixture together with 1-15wt% of water for the mixture at room temperature for 10 min-1hr; b) forming granules out of the

product of step a) using a granulator; and c) drying the product of step b) in a fluidized bed dryer at 70-150°C for 10 min-1hr.

### **Best Mode for Carrying Out the Invention**

5 Water dispersible granule containing paraquat according to the present invention comprises 5-50wt% of Paraquat, 5-30wt% of a surfactant, 1-20wt% of a breakage promoter, and the remainder being an extender, wherein said water dispersible granule is prepared by mixing the above components, kneading the mixture together with a small amount of water, forming granules out of the kneaded mixture using a granulator  
10 or the like, and drying the granules.

The Paraquat removes weeds on ridgeway or non-farm land directly and has the chemical name of 1,1'-dimethyl-4,4'-bipyridyldiylum dichloride. The purity of paraquat may be in the range of 1-100%, and can be selected adequately according to suppliers of paraquat or formulation types.

15 The surfactant is a compound having large surface activity and amphiphilic compound which has both hydrophilic and lipophilic groups in the molecule thereof. It is characterized by its superior detergent power, dispersion power, emulsification power, solubilization power, wetting power, germicidal power, bubbling power and infiltration power. It acts as a wetting, a breakage and dispersion compound such that paraquat can  
20 show its activity effectively.

As the surfactant, there can be used at least one selected from the group consisting of sodium or calcium salts of sulfonate such as alkyl (C<sub>8-12</sub>) arylsulfonate, dialkyl (C<sub>3-6</sub>) arylsulfonate, dialkyl (C<sub>8-12</sub>) arylsulfosuccinate, ligninsulfonate, naphthalenesulfonate condensate, naphthalenesulfonate formalin condensate, alkyl (C<sub>8-12</sub>)

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naphthalenesulfonate formalin condensate and polyoxyethylenealkyl (C<sub>8-12</sub>) phenylsulfonate; sodium or calcium salts of sulfate such as alkyl (C<sub>8-12</sub>) sulfate, alkyl (C<sub>8-12</sub>) arylsulfate, polyoxyethylenealkyl (C<sub>8-12</sub>) sulfate and polyoxyethylene alkyl (C<sub>8-12</sub>) phenylsulfate; sodium or calcium salts of succinates such as  
5 polyoxyalkylenesuccinate; anionic surfactant such as sodium benzoate and alkylcarboxylate; and nonionic surfactant such as polyoxyethelylenealkyl (C<sub>8-12</sub>) ether, polyoxyethelylenealkyl (C<sub>8-12</sub>) phenylether, polyoxyethelylenealkyl (C<sub>8-12</sub>) phenyl polymer and ethylene oxide propylene oxide copolymer. The above compounds are only examples and it may be easily understood to the artisan that other surfactants can also  
10 be used.

The breakage promoter facilitates a breakage and dispersion of the water dispersible granule containing paraquat according to the present invention. There can be used as the breakage promoter at least one selected from the group consisting of Sodium sulfate (Na<sub>2</sub>SO<sub>4</sub>), sodium nitrate (NaNO<sub>3</sub>), potassium chloride (KCl),  
15 ammonium sulfate ((NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>), urea, polyvinyl pyrrolidone and the like.

The extender works as a filler of the water dispersible granule according to the present invention. It maintains the shape of the water dispersible granule and supports the effect development of the agrochemical active component. There can be used as the extender at least one selected from the group consisting of Diollite, kaolin, clay, white  
20 carbon, water-soluble starch, bentonite, pyrophillite, talc, and the like. It may be easily understood to the artisan that other extenders can also be used.

Hereunder is given a detailed description of the water dispersible granule according to the present invention using examples and comparative examples. The following examples are intended to be illustrative of the present invention and should not be  
25 construed as limiting the scope of the present invention.

### **Example 1**

30wt% of 42.5%-Paraquat, 5wt% of sodium naphthalenesulfonate formaldehyde condensate, 2wt% of ethylene oxide propylene oxide copolymer, 5wt% of octylnaphthalenesulfonate, 5wt% of ammonium sulfate, and the remainder of pyrophyllite were mixed. Then, the mixture was kneaded together with 8wt% of water for the mixture at room temperature for 30 minutes. Next, granules were formed out of the kneaded mixture using a granulator. Then, the granules were dried in a fluidized bed dryer at 120°C of suction air for 30 minutes. The thus prepared water dispersible granules were used for biotest and physicochemical analysis.

### **Example 2**

30wt% of 42.5%-Paraquat, 5wt% of sodium octylnaphthalenesulfonate, 2wt% of ethylene oxide propylene oxide copolymer, 5wt% of octybenzenesulfate, 5wt% of sodium nitrate, and the remainder of pyrophyllite were mixed. Hereinafter, the procedure of Example 1 was followed.

### **Example 3**

40wt% of 42.5%-Paraquat, 5wt% of sodium naphthalenesulfonate formaldehyde condensate, 2wt% of ethylene oxide propylene oxide copolymer, 5wt% of octylnaphthalenesulfonate, 5wt% of ammonium sulfate, and the remainder of pyrophyllite were mixed. Hereinafter, the procedure of Example 1 was followed.



#### **Example 4**

40wt% of 42.5%-Paraquat, 5wt% of sodium octylnaphthalenesulfonate, 2wt% of ethylene oxide propylene oxide copolymer, 5wt% of octybenzenesulfate, 5wt% of sodium nitrate, and the remainder of pyrophyllite were mixed. Hereinafter, the procedure of Example 1 was followed.

#### **Comparative Example 1**

A soluble concentrate of 24.5%-Paraquat solution commercially available was purchased and used for biotest in order to compare with the examples of the present invention.

#### **Comparative Example 2**

A soluble concentrate of 41%-glyphosate isopropylamine was purchased and used for biotest in order to compare with the examples of the present invention.

#### **Test of Agrochemical Effect on Barnyard Millet**

After treating the barnyard millet with the products prepared from the examples and the comparative examples, the agrochemical effect was checked 1, 2, 4, 7, 10 and 14 days, respectively, after treatment.

The barnyard millet having a length of 42 cm was treated according to the results are also disclosed in the following Table 1.

Table 1. Test Result for Barnyard Millet

	Dosage ( /10a)	Agrochemical Effect after Treatment (%)					
		1 Day	2 Day	4 Day	7 Day	10 Day	14 Day
Example 1	580g	90	95	95	90	85	70
	1160g	96	98	97	94	90	90
Example 2	580g	90	93	94	88	80	73
	1160g	95	96	97	93	88	85
Example 3	435g	93	94	96	90	80	75
	870g	96	98	98	94	92	88
Example 4	435g	92	95	93	90	80	78
	870g	96	96	96	92	90	88
Comparative Example 1	300ml	90	94	94	90	77	60
	600ml	95	96	95	88	80	60
Comparative Example 2	300ml	5	10	20	70	82	93
	600ml	10	20	30	85	88	97

As is shown above, the water dispersible granule prepared according to each example showed superior agrochemical effect against barnyard millets, compared with the soluble concentrate of paraquat in comparative example 1 in treatment with reference and double quantity. It also showed superior effect-continuation, that is, lower regenerating ratio after 5 days, and showed much superior initial effect, compared with the soluble concentrate of glyphosate in comparative example 2.

#### 10 Test of Agrochemical Effect on Crab grass

After treating the crab grasses with the products prepared from the examples and the comparative examples, the agrochemical effect was checked 1, 2, 4, 7, 10 and 14 days, respectively, after treatment.

The crab grasses having a length of 45 cm were treated according to the results are also disclosed in the following Table 2.

Table 2. Test Result for Crab Grass

	Dosage (/10a)	Agrochemical Effect after Treatment (%)					
		1	2	4	7	10	14
		Day	Day	Day	Day	Day	Day
Example 1	580g	94	98	99	98	88	74
	1160g	96	98	99	99	96	90
Example 2	580g	95	97	98	98	90	73
	1160g	98	98	99	99	98	95
Example 3	435g	96	98	98	99	93	85
	870g	97	98	98	98	92	88
Example 4	435g	94	97	98	96	90	78
	870g	96	99	99	99	97	88
Comparative Example 1	300ml	94	96	95	93	87	70
	600ml	95	97	97	96	90	80
Comparative Example 2	300ml	10	20	40	75	92	95
	600ml	15	30	50	85	93	99

5

As is shown above, the water dispersible granule prepared according to each example showed superior agrochemical effect against crab grass, compared with the soluble concentrate of paraquat in comparative example 1 in treatment with reference and double quantity. It also showed superior effect-continuation, and showed much superior initial effect (94% or more).

10

### Test of Agrochemical Effect on Fleabane

After treating the fleabanes with the products prepared from the examples and the comparative examples, the agrochemical effect was checked 1, 2, 4, 7, 10 and 14 days, respectively, after treatment.

- 5 The fleabanes having a length of 12 cm were treated according to the results are also disclosed in the following Table 3.

Table 3. Test Result for Fleabane

	Dosage (/10a)	Agrochemical Effect after Treatment (%)					
		1	2	4	7	10	14
		Day	Day	Day	Day	Day	Day
Example 1	580g	85	88	90	85	80	70
	1160g	86	88	92	90	85	77
Example 2	580g	80	88	88	88	78	68
	1160g	85	90	92	88	84	75
Example 3	435g	85	90	90	90	85	70
	870g	90	92	93	94	92	80
Example 4	435g	85	89	89	90	86	72
	870g	90	90	90	89	85	80
Comparative Example 1	300ml	80	86	85	85	76	65
	600ml	90	90	89	88	88	70
Comparative Example 2	300ml	10	20	30	40	70	73
	600ml	10	25	45	60	82	83

- 10 As is shown above, the water dispersible granule prepared according to each example showed superior agrochemical effect against fleabanes, compared with the soluble concentrate of paraquat in comparative example 1 in treatment with reference and double quantity. It also showed superior effect-continuation, that is, lower

regenerating ratio, compared with agrochemical in the comparative example 1. It also showed much superior initial effect, compared with agrochemical in the comparative examples.

#### 5 Test of Agrochemical Effect on Mugwort

After treating the mugworts with the products prepared from the examples and the comparative examples, the agrochemical effect was checked 1, 2, 4, 7, 10 and 14 days, respectively, after treatment.

The barnyard millet having a length of 20 cm was treated according to the results  
10 are also disclosed in the following Table 4.

Table 4. Test Result for Mugwort

	Dosage (/10a)	Agrochemical Effect after Treatment (%)					
		1 Day	2 Day	4 Day	7 Day	10 Day	14 Day
Example 1	580g	86	95	96	92	87	80
	1160g	90	98	100	95	90	85
Example 2	580g	85	93	97	93	88	83
	1160g	88	96	99	94	90	86
Example 3	435g	86	96	96	90	85	80
	870g	90	98	100	96	91	86
Example 4	435g	86	93	96	91	86	81
	870g	88	96	100	95	90	85
Comparative Example 1	300ml	85	90	93	89	84	76
	600ml	88	92	95	90	85	80
Comparative Example 2	300ml	5	5	20	40	70	92
	600ml	5	10	25	60	85	99

As is shown above, the water dispersible granule prepared according to each example showed superior agrochemical effect against mugworts, compared with the soluble concentrate of paraquat in comparative example 1 in treatment with reference and double quantity. It also showed superior effect-continuation, that is, lower  
5 regeneration ratio after 14 days, compared with the soluble concentrate of paraquat.

#### **Test of Agrochemical Effect on Copperleaf**

After treating the copperleaves with the products prepared from the examples and the comparative examples, the agrochemical effect was checked 1, 2, 4, 7, 10 and 14 days, respectively, after treatment.

10 The copperleaves having a length of 15 cm was treated according to the results are also disclosed in the following Table 5.

Table 5. Test Result for Copperleaf

	Dosage (/10a)	Agrochemical Effect after Treatment (%)					
		1 Day	2 Day	4 Day	7 Day	10 Day	14 Day
Example 1	580g	80	90	95	100	100	98
	1160g	86	94	100	100	100	99
Example 2	580g	82	93	95	99	100	97
	1160g	85	96	97	100	100	100
Example 3	435g	83	89	96	100	100	96
	870g	86	98	100	100	100	99
Example 4	435g	82	90	95	100	100	97
	870g	86	96	96	100	100	100
Comparative Example 1	300ml	80	90	96	100	100	95
	600ml	85	96	98	100	100	97
Comparative Example 2	300ml	0	0	8	20	30	40
	600ml	0	0	10	25	40	50

As is shown above, the water dispersible granule prepared according to each example showed superior agrochemical effect against copperleaves, compared with the soluble concentrate of paraquat in comparative example 1 in treatment with reference and double quantity. Further, there were few regenerated copperleaves even 14 days after treatment.

### Test of Agrochemical Effect Stability after Long-term Storage

Agrochemical effect of the water dispersible granule that was stored for a predetermined period on barnyard millets was tested in order to check the effect drop.

The products prepared according to the examples and the comparative example 1 were tested immediately after preparation, after 1, 2, 3, 6 and 12 month storage, respectively. The agrochemical effect was checked on the next day of treatment according to the following Table 6.

Table 6. Test Result after Long-term Storage

	Dosage (/10a)	Agrochemical Effect after Treatment (%)				
		Immediately after preparation	a month later	2 months later	6 months later	A year later
Example 1	580g	90	92	88	91	89
Example 2	580g	91	90	89	91	92
Example 3	435g	89	88	90	98	91
Example 4	435g	92	87	90	90	88
Comparative Example 1	300ml	89	90	91	90	87

As is shown above, the water dispersible granule according to the examples effect

on barnyard millets after long-term storage like the products of the comparative examples. Therefore, it has no problem related to long-term storage.

### Storage Stability Test

- 5 To confirm the storage stability of the product according to the examples, a time course test was carried out at 15°C and 50°C. The result are disclosed in following Table 7

Table 7. Test Result of the Water Dispersible Granule according to the Examples

	Storage Temperat -ure	Net content of paraquat (%)					
		Imme -diately preparat -ion	A week later	4 weeks later	8 weeks later	16 weeks later	32 weeks later
Example 1	15°C	12.8	12.8	12.8	12.8	12.8	12.8
	50°C	12.8	12.8	12.8	12.7	12.7	12.6
Example 2	15°C	12.8	12.8	12.8	12.8	12.8	12.8
	50°C	12.8	12.8	12.8	12.8	12.7	12.7
Example 3	15°C	17.0	17.0	17.0	17.0	17.0	17.0
	50°C	17.0	16.9	16.9	16.9	16.9	16.7
Example 4	15°C	17.0	17.0	17.0	17.0	17.0	17.0
	50°C	17.0	17.0	17.0	16.9	16.8	16.8

- As is shown above only, less than 2% of Paraguant in the water dispersible granule prepared according to the present invention was decomposed even after 32 weeks of storage under the harsh condition of 50°C. So, the composition is stable after the long-term storage.



As is shown from the above test results, the water dispersible granule according to the present invention shows superior effect on barnyard millets, crab grasses, fleabanes, mugworts and copperleaves. Further, it has the effect of lowering the regenerating ratio of weeds, such as barnyard millets, crab grasses, fleabanes, mugworts and copperleaves that have high regenerating ratio. Further, it has agrochemical effect stability and storage stability even after long-term storage.

### **Industrial Applicability**

The water dispersible granule according to the present invention is prepared by mixing and kneading paraquat, a surfactant, a breakage promoter, and an extender, forming granules out of the kneaded mixture, and drying the granules.

It can prevent the danger of poisoning caused by contact or ingestion when a conventional soluble concentrate or wettable powder is used, and of poisoning due to intake by accident or on purpose.

Further, the water dispersible granule according to the present invention maintains its effect after long-term storage. So, it can remove the weeds on ridgeway or non-farm land effectively. Further, it has the fast effect as the soluble concentrate of paraquat, so it can remove the weeds only 3 days after treatment.

Though the present invention was described in detail with specific embodiments, it is obvious that the present invention can be modified and corrected variously within the scope of its technical concept. And it is also obvious that such modification and correction fall within the appended claims.

WHAT IS CLAIMED IS:

1. Water dispersible granule containing paraquat comprising 5-50wt% of Paraquat Dichloride, 5-30wt% of a surfactant, 1-20wt% of a breakage promoter, and the remainder being an extender, wherein said water dispersible granule is prepared by mixing the above components, kneading the mixture together with a small amount of water, forming granules out of the kneaded mixture using a granulator or the like, and drying the granules.
2. Water dispersible granule according to Claim 1, wherein said surfactant is an anionic surfactant and/or a nonionic surfactant.
3. Water dispersible granule according to Claim 1, wherein said breakage promoter is at least one selected from the group consisting of sodium sulfate, sodium nitrate, potassium chloride, ammonium sulfate, urea, polyvinylpyrrolidone, and the like.
4. Water dispersible granule according to Claim 1, wherein said extender is at least one selected from the group consisting of diollite, kaolin, clay, white carbon, watersoluble starch, calcium carbonate, bentonite, pyrophyllite, talc, and the like.
5. A preparing method of water dispersible granule containing paraquat comprising:
  - a) mixing paraquat dichloride, a surfactant, a breakage promoter, and an extender, and kneading the mixture together with 1-15wt% of water for the mixture at room temperature for 10 min-1hr;
  - b) forming granules out of product of step a) using a granulator; and
  - c) drying product of step b) in a fluidized bed dryer at 70-150°C for 10 min-1hr.

## ABSTRACT OF DISCLOSURE

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The present invention relates to a water dispersible granule containing Paraquat Dichloride (hereunder referred to as "Paraquat") and preparation method thereof. The paraquat, an active component of a nonselective herbicide, is generally known to be inactive due to its strong adsorption to minerals in the soil, particularly to an extender such as clay, bentonite, talc, pyrophyllite, montmorillonite, etc. Paraquat is transformed into the water dispersible granule type, so that the water dispersible granule type can be safe to the human body and have superior agrochemical effect than other formulation types such as soluble concentrate type or wettable powder type.

The agrochemical composition according to the present invention is prepared by mixing and kneading 5-50wt% of Paraquat, 5-30wt% of a surfactant, 1-20wt% of a breakage promoter, and the remainder being an extender, forming granules out of the kneaded mixture, and drying the granules.

15 The present invention prevents skin damage caused by contact during agrochemical treatment, respiratory organ damage, and the danger of agrochemical intake by accident or on purpose, by transforming the Paraquat which can cause skin damage and inhalation damage, into the water dispersible granule form.

PAS205PCTUS

**DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name; I believe that I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled **WATER DISPERSIBLE GRANULE CONTAINING PARAQUAT DICHLORIDE AND ITS PREPARING METHOD**, the specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37. Code of Federal Regulations, §1.56, and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) on which priority is claimed.

Prior Foreign Application(s):

Korean Patent Appln. 99-41035, filed September 22, 1999.

PCT Appln. No PCT/KR00/01051, filed on September 19, 2000

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below:

None.

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

None.

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POWER OF ATTORNEY. As a named inventor, I hereby appoint the following attorneys to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: Irving M. Weiner, Reg. No. 22,168, and Pamela S. Burt, Reg. No. 27,861.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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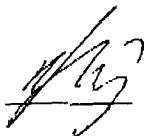
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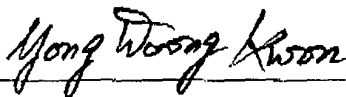
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